

**Vue cycle du programme des cours**

B1 Or Th Pr Au Cr

If one or several of the mandatory courses have already been credited when entering the Master of Data science program, they can be replaced by a corresponding amount of credits chosen among the elective courses.

**Compulsory courses (B1 : 20Cr, B2 : 35Cr)**
**Computer Science, Applied Mathematics and Data Science fundamentals :**

INFO0016-1	<i>Introduction to the theory of computation</i> (anglais) - Quentin LOUVEAUX	B1	Q1	26	26	-	5
MATH0461-2	<i>Introduction to numerical optimization</i> (anglais) - Quentin LOUVEAUX - [25h Proj.]	B1	Q1	30	20	[+]	5
ELEN0060-2	<i>Information and coding theory</i> (anglais) - Louis WEHENKEL - [30h Proj.]	B1	Q2	30	15	[+]	5
ELEN0062-1	<i>Introduction to machine learning</i> (anglais) - Pierre GEURTS, Louis WEHENKEL - [40h Proj.]	B1	Q1	30	5	[+]	5

**Master thesis**

ATFE9009-1	<i>Master thesis</i> (anglais) - Pierre GEURTS - [750h Proj.]	B2	TA	-	-	[+]	25
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**Management and legal issues**

DROI1357-1	<i>European law, (big) data and artificial intelligence applications seminar</i> (anglais) - - Suppl : Ljupcho GROZDANOVSKI	B2	Q1	24	-	-	5
GEST3162-1	<i>Principles of management</i> (anglais) - François PICHault, Willem STANDAERT - [25h Proj.]	B2	Q1	30	-	[+]	5

[...] Students who have already acquired the skills and knowledge of GEST3162 (or equivalent) will replace it by a course of their choice of 5 ECTS

**Elective courses (B1 : 40Cr, B2 : 25Cr)**
**Single focus (B1 : 30Cr)**
**Professional focus in data science (B1 : 30Cr)**

MATH2021-1	<i>High-dimensional data analysis</i> (anglais) - Gentiane HAESBROECK - [30h Proj.]	B1	Q1	30	15	[+]	5
INFO8002-1	<i>Large-scale data systems</i> (anglais) - Gilles LOUPPE - [45h Proj.]	B1	Q1	25	10	[+]	5
PROJ0016-1	<i>Big data project</i> (anglais) - Bertrand CORNÉLUSSE, Pierre GEURTS, Gilles LOUPPE, Gilles LOUPPE - [180h Proj.]	B1	TA	25	-	[+]	10
<b>Corequis :</b>							
INFO8006-1	Introduction to artificial intelligence						
INFO9014-1	<i>Knowledge representation and reasoning</i> (anglais) - Christophe DEBRUYNE	B1	Q2	24	20	-	5
INFO8010-1	<i>Deep learning</i> (anglais) - Gilles LOUPPE - [55h Proj.]	B1	Q2	25	10	[+]	5

Choose 10 credits in the following list among those that have not already been credited before entering the Master programme : (B1 : 10Cr)

INFO8006-1	<i>Introduction to artificial intelligence</i> (anglais) - Gilles LOUPPE - [45h Proj.]	B1	Q1	25	20	[+]	5
INFO8003-1	<i>Optimal decision making for complex problems</i> (anglais) - Damien ERNST - [45h Proj.]	B1	Q2	25	10	[+]	5
INFO8004-1	<i>Advanced Machine learning</i> (anglais) - Pierre GEURTS, Gilles LOUPPE, Louis WEHENKEL - [45h Proj.]	B1	Q2	25	-	[+]	5
INFO2049-1	<i>Web and Text Analytics</i> (anglais) - Ashwin ITTOO	B1	Q1	30	-	-	5
ELEN0016-2	<i>Computer vision</i> (anglais) - Marc VAN DROOGENBROECK - [50h Proj.]	B1	Q1	30	10	[+]	5

INFO0948-2	<i>Introduction to intelligent robotics</i> (anglais) - Pierre SACRÉ - [80h Proj.]	B1	Q2	30	4	[+]	5
PROJ0017-1	<i>Personal student project in Data Science</i> (anglais) - Pierre GEURTS, Gilles LOUPPE - [150h Proj.]	B1	TA	-	-	[+]	5
INFO9015-1	<i>Logic for Computer Science</i> (anglais) - Pascal FONTAINE	B1	Q1	24	20	-	5
INFO0027-2	<i>Programming techniques</i> (anglais) - <i>Algorithmics</i> - Laurent MATHY - [40h Proj.] - <i>Software patterns</i> - Laurent MATHY - [30h Proj.]	B1	Q2	14	14	[+]	5
INFO0010-4	<i>Introduction to computer networking</i> (anglais) - Guy LEDUC - [12h Labo., 40h Proj.]	B1	Q1	35	2	[+]	5
INFO0940-1	<i>Operating systems</i> (anglais) - Laurent MATHY - [30h Proj.]	B1	Q2	30	6	[+]	5
INFO0045-3	<i>Introduction to computer security</i> (anglais) - Benoît DONNET - [10h Labo., 30h Proj.]	B1	Q1	30	6	[+]	5
INFO8011-1	<i>Network infrastructures</i> (anglais) - Benoît DONNET, Guy LEDUC, Laurent MATHY - [12h Labo., 30h Proj.] (années impaires)	B1	Q1	30	-	[+]	5

Choose 25 credits in the following topics, among those that have not already been credited in Block 1 or before entering this Master programme : (B2 : 25Cr)

#### Elective courses in Data Science and Artificial Intelligence

INFO8004-1	<i>Advanced Machine learning</i> (anglais) - Pierre GEURTS, Gilles LOUPPE, Louis WEHENKEL - [45h Proj.]	B2	Q2	25	-	[+]	5
INFO2049-1	<i>Web and Text Analytics</i> (anglais) - Ashwin ITTOO	B2	Q1	30	-	-	5
GEST5006-1	<i>SAS Certification applied analytics</i> (anglais) - Michael SCHYNS	B2	Q2	15	25	-	5
MATH2022-1	<i>Large sample analysis : theory and practice</i> (anglais) - <i>General course</i> - Arnout VAN MESSEM - [10h Proj.] - <i>Project complement</i> - Arnout VAN MESSEM - [30h Proj.]	B2	Q2	24	12	[+]	5
INFO8003-1	<i>Optimal decision making for complex problems</i> (anglais) - Damien ERNST - [45h Proj.]	B2	Q2	25	10	[+]	5
ELEN0016-2	<i>Computer vision</i> (anglais) - Marc VAN DROOGENBROECK - [50h Proj.]	B2	Q1	30	10	[+]	5
INFO0948-2	<i>Introduction to intelligent robotics</i> (anglais) - Pierre SACRÉ - [80h Proj.]	B2	Q2	30	4	[+]	5

#### Elective courses in Computer Science and Applied Mathematics

INFO0027-2	<i>Programming techniques</i> (anglais) - <i>Algorithmics</i> - Laurent MATHY - [40h Proj.] - <i>Software patterns</i> - Laurent MATHY - [30h Proj.]	B2	Q2	14	14	[+]	5
INFO0939-1	<i>High performance scientific computing</i> (anglais) - Christophe GEUZAINÉ - [20h Proj.]	B2	Q1	30	15	[+]	5
INFO0010-4	<i>Introduction to computer networking</i> (anglais) - Guy LEDUC - [12h Labo., 40h Proj.]	B2	Q1	35	2	[+]	5
INFO0940-1	<i>Operating systems</i> (anglais) - Laurent MATHY - [30h Proj.]	B2	Q2	30	6	[+]	5
INFO0045-3	<i>Introduction to computer security</i> (anglais) - Benoît DONNET - [10h Labo., 30h Proj.]	B2	Q1	30	6	[+]	5
INFO8011-1	<i>Network infrastructures</i> (anglais) - Benoît DONNET, Guy LEDUC, Laurent MATHY - [12h Labo., 30h Proj.] (années impaires)	B2	Q1	30	-	[+]	5
MATH0462-1	<i>Discrete optimization</i> (anglais) - Quentin LOUVEAUX - [25h Proj.]	B2	Q2	30	20	[+]	5
MQGE0002-3	<i>Computational Optimization</i> (anglais) - Yves CRAMA	B2	Q2	30	-	-	5
INFO9015-1	<i>Logic for Computer Science</i> (anglais) - Pascal FONTAINE	B2	Q1	24	20	-	5

**Elective courses in bioinformatics**

GBIO0002-1	<i>Genetics and bioinformatics</i> (anglais) - Franck DEQUIEDT, Kristel VAN STEEN - [15h Proj.]	B2	Q1	30	15	[+]	5
GBIO0009-1	<i>Topics in bioinformatics</i> (anglais) - Kristel VAN STEEN - [35h Proj.]	B2	Q1	25	15	[+]	5
GBIO0030-1	<i>Computational approaches to statistical genetics</i> (anglais) - Kristel VAN STEEN - [35h Proj.]	B2	Q2	25	15	[+]	5

**Elective courses in management**

GEST3032-1	<i>eBusiness and eCommerce</i> (anglais) - Ashwin ITTOO	B2	Q1	30	-	-	5
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**Optional company internships**

*Remarque* : the course units ASTG9008-1 and ASTG9009-1 are mutually exclusive

ASTG9008-1	<i>Internship (coupled with Master thesis)</i> (anglais) - Pierre GEURTS - [80j T. t.]	B2	TA	-	-	[+]	5
ASTG9009-1	<i>Internship (independent of Master thesis)</i> - Pierre GEURTS - [40j T. t.]	B2	TA	-	-	[+]	10

**Miscellaneous**

INGE0012-1	<i>Scientific research in engineering and its impact on innovation</i> (anglais) - Rodolphe SEPULCHRE	B2	Q2	26	26	-	5
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[...] With the agreement of the President of the Jury, students may also choose up to 15 credits in the application area of their Master thesis in other programmes of the university

[...] With the agreement of the President of the Jury, students may also choose 5 credits in any other programme of the university.

## Crédits supplémentaires Master en ingénieur civil en sciences des données (120 ECTS)

**Optional courses (B0 : 47Cr)**

Students who are admitted to this master without having acquired equivalent courses must add them to the programme of their first year. (B0 : 47Cr)

**1. Basic courses of a bachelor degree of science in engineering, including courses equivalent to :**

MATH0002-4	<i>Analyse mathématique 1</i> - Eric DELHEZ	B0	Q1	22	22	-	4
MATH0013-1	<i>Algèbre</i> - Eric DELHEZ	B0	Q1	26	26	-	5
MATH0062-1	<i>Éléments du calcul des probabilités</i> - Pierre SACRÉ - [25h Proj.]	B0	Q2	15	10	[+]	3
MATH0487-2	<i>Éléments de statistiques</i> - Pierre SACRÉ - [25h Proj.]	B0	Q1	15	10	[+]	3
MATH0488-1	<i>Éléments de processus stochastiques</i> - Maarten ARNST, Vincent DENOËL, Pierre GEURTS - [30h Proj.]	B0	Q2	10	10	[+]	2
INFO2009-2	<i>Introduction à l'informatique</i> - Bernard BOIGELOT	B0	Q1	24	14	-	4
MATH0006-3	<i>Introduction to numerical analysis</i> (anglais) - Quentin LOUVEAUX	B0	Q1	20	20	-	4
MECA0003-2	<i>Mécanique rationnelle</i> - Eric DELHEZ	B0	Q1	20	30	-	4
SYST0002-2	<i>Introduction aux signaux et systèmes</i> - Guillaume DRION - [15h Proj.]	B0	Q1	26	26	[+]	5

**2. Additional courses in computer science :**

INFO0902-1	<i>Structures des données et algorithmes</i> - Pierre GEURTS - [40h Proj.]	B0	Q2	26	20	[+]	5
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INFO0009-2	<i>Bases de données (organisation générale)</i> - Christophe DEBRUYNE - [25h Proj.]	B0	Q2	26	26	[+]	5
INFO8006-1	<i>Introduction to artificial intelligence</i> (anglais) - Gilles LOUPPE - [45h Proj.]	B0	Q1	25	20	[+]	5

**3. A level B2 in English.**